

Selected Boring Logs and Monitoring Well Construction Details

Soil Classification System

MAJOR DIVISIONS			USCS GRAPHIC LETTER SYMBOL SYMBOL ⁽¹⁾		TYPICAL DESCRIPTIONS ⁽²⁾⁽³⁾
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
		SAND WITH FINES (Appreciable amount of fines)		GC	Clayey gravel; gravel/sand/clay mixture(s)
		CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SP	Poorly graded sand; gravelly sand; little or no fines
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)		SM	Silty sand; sand/silt mixture(s)	
			SC	Clayey sand; sand/clay mixture(s)	
			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity	
	SILT AND CLAY (Liquid limit greater than 50)		CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay	
			OL	Organic silt; organic, silty clay of low plasticity	
			MH	Inorganic silt; micaceous or diatomaceous fine sand	
HIGHLY ORGANIC SOIL		CH	Inorganic clay of high plasticity; fat clay		
		OH	Organic clay of medium to high plasticity; organic silt		
			PT	Peat; humus; swamp soil with high organic content	

OTHER MATERIALS	USCS GRAPHIC LETTER SYMBOL SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT	AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK	RK	Rock (See Rock Classification)
WOOD	WD	Wood, lumber, wood chips
DEBRIS	DB	Construction debris, garbage

- Notes: 1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)* outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the *Standard Test Method for Classification of Soils for Engineering Purposes*, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:
- Primary Constituent: > 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
 - Secondary Constituents: > 30% and < 50% - "very gravelly," "very sandy," "very silty," etc.
 - Additional Constituents: > 15% and < 30% - "gravelly," "sandy," "silty," etc.
 - Additional Constituents: > 5% and < 15% - "with gravel," "with sand," "with silt," etc.
 - < 5% - "trace gravel," "trace sand," "trace silt," etc., or not noted.

Drilling and Sampling Key		Field and Lab Test Data	
SAMPLE NUMBER & INTERVAL	SAMPLER TYPE	Code	Description
	Code	a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
	Description	b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
		c	Shelby Tube
		d	Grab Sample
		e	Other - See text if applicable
		1	300-lb Hammer, 30-inch Drop
		2	140-lb Hammer, 30-inch Drop
		3	Pushed
Groundwater		4	Other - See text if applicable
ATD			
Approximate water elevation at time of drilling (ATD) or on date noted. Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.			
		PP = 1.0	Pocket Penetrometer, tsf
		TV = 0.5	Torvane, tsf
		PID = 100	Photoionization Detector VOC screening, ppm
		W = 10	Moisture Content, %
		D = 120	Dry Density, pcf
		-200 = 60	Material smaller than No. 200 sieve, %
		GS	Grain Size - See separate figure for data
		AL	Atterberg Limits - See separate figure for data
		GT	Other Geotechnical Testing
		CA	Chemical Analysis

5/10/05 I:\EDM\DATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL CLASS SHEET

MW-109

SAMPLE DATA

SOIL PROFILE

GROUNDWATER

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: <u>Hollow-stem Auger</u> Ground Elevation (ft): <u>15.46445 (MSL)</u>
15							SP	Gray, fine SAND with roots (loose, moist)(no odor, no sheen)
							SM	Dark gray, silty, fine SAND with gravel and organics (loose, moist)(no odor, no sheen)
5	10	a2		31			SP	Gray, fine SAND with trace organics (loose, moist)(no odor, no sheen) (loose, wet)(no odor, no sheen)
		a2		17			SM	Black, silty, fine SAND with gravel (medium dense, wet)(no odor, no sheen) -with a piece of rock-like slag material
10	5	a2		9			ML	Black, sandy, SILT with coarse sand (medium dense, wet)(no odor, no sheen)
		a2		17			WD	Large wood
		a2		50/0"				
15	0	a2		50/0"				

▽ ATD

Boring Completed 04/05/04
Total Depth of Boring = 18.0 ft.

- Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009_5/10/05 \\EDMDATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV

MW-110

SAMPLE DATA

SOIL PROFILE

GROUNDWATER

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger	Ground Elevation (ft): 14.40752 (MSL)	Water Level
								Crushed Rock		
							SP	Gray, fine SAND, trace gravel (medium dense, moist)(fill)		
10			a1	16	0		SM	Dark gray, silty, fine SAND with organics (medium dense, moist)(no odor, no sheen)(fill)		
5			a1	14	0			(musty garbage-like odor, no sheen)		
			a1	7	0		WD	WOOD debris with silt (loose, moist to wet)(strong garbage-like odor, no sheen)(fill)		
			a1	9	20					▽ ATD
10			a1	10						
			a1	45	8					
			a1	35				(dense, wet)(strong garbage-like odor, sheen on soil water)(fill)		
15			a1	40						
			a1	100	9					
			a1	16						
			a1	20						
20			a1	27			ML	Gray with rust mottling, SILT (stiff, moist)(no odor, no sheen)(native)		

Boring Completed 04/01/04
Total Depth of Boring = 22.0 ft.

- Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009, 5/10/05 \\IEDM\DATA\GINT\GINT\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV

LSB-5

SAMPLE DATA

SOIL PROFILE

GROUNDWATER

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): 14.83549 (MSL)	Water Level
5	10	LSB-5 4-5 @1015	a1	19	0		SM	Dark gray, silty, fine SAND with gravel (medium dense, moist)(no odor, no sheen)	
			a1	8			SM	Black, silty, fine SAND with gravel (loose, moist)(no odor, no sheen)	
		LSB-5 7-8 @1045	a1	5	0				▽ ATD
		LSB-5 9-10 @1050	a1	6	0			(loose, wet)(no odor, heavy petroleum/creosote sheen)	
10	5	SLB-5 10-11 @1100	a1	8					
			a1	10	0		WD	WOOD debris (loose, wet)(strong hydrogen sulfide odor, heavy sheen)	
		LSB-5 14-15 @1105	a1	12					
			a1	10	0				
			a1	8					
			a1	11					
20	-5		a1	11			ML	Gray, SILT, trace shell fragments (stiff, moist) -with rust mottling	

Boring Completed 03/31/04
Total Depth of Boring = 20.5 ft.

- Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009_5/10/05 \EDMDATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV



LANDAU
ASSOCIATES

Scott Paper
Anacortes, WA

Log of LSB-5

Figure
B-4

LSB-6

SAMPLE DATA						SOIL PROFILE		GROUNDWATER
Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: <u>Hollow-stem Auger</u> Ground Elevation (ft): <u>10.24164 (MSL)</u> Water Level
10							AC SM	Asphalt
								Dark gray, silty, fine SAND with gravel (medium dense, moist)(no odor, no sheen)(fill)
5	5	LSB-6 4-5 @0905	a1	6	0			Dark gray to black, silty, fine SAND with trace gravel and wood debris (loose, moist)(no odor, slight sheen)(fill)
		LSB-6 6-7 @0915	a1	14	0		WD	WOOD debris with silt (medium dense, moist to wet)(no odor, no sheen)(fill)
			a1	40				
			a1	19				
10	0		a1	17				
			a1	12	0			
		LSB-6 14-15 @0920	a1	14				
15	-5		a1	14	0			
			a1	9				
			a1	17				
20	-10		a1	46			ML	Gray SILT with trace gravel and rust mottling (very stiff, moist)(no odor, no sheen)

Boring Completed 03/31/04
Total Depth of Boring = 20.5 ft.

- Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009 5/10/05 \\EDM\DATA\GINT\GINT\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV



LANDAU
ASSOCIATES

Scott Paper
Anacortes, WA

Log of LSB-6

Figure
B-5

SUBSURFACE EXPLORATION LOG

CLIENT: Log Sort Yard
 JOB NUMBER: 5494-001-300
 LOCATION: ANACORTES, WA
 SURFACE ELEVATION:

GEOLOGIST: Siegfried Traeger
 DATE DRILLED: 3/15/93
 DRILLING COMPANY: HAYES DRILLING, INC.
 REVIEWED BY: 0

BORING NUMBER: B-7

TOTAL DEPTH: 21.5 Feet
 DRILLING METHOD: Hollow Stem Auger
 SAMPLE METHOD:
 APPROVED BY: 0

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
							Brown wood debris and very loose soil, damp.	WD		
5			0.0	SS	3-1-3		Dark yellow (uniform color); compacted sawdust, no spoil, damp.	WD		5
		B-7-8	0.0	SS	4-2-5		Black; compacted sawdust, wood debris, damp.	WD		10
15			0.0	SS	4-6-7		Dark gray; wood debris, sawdust, no soil, wet. **	WD		15
			0.0	SS	7-15-30		Light gray; clay, some wood debris, dry. **	ML		18
20			0.0	SS	0-10-8		Light gray; clay, medium stiff, some gravel pieces, dry.	ML		20
25							NOTES: 1) Bottom of hole at 21.5 feet. *) Boring was moved 10 ft. south due to auger refusal at original site **) Smell of rotten eggs			25

SAMPLER TYPE

SS - SPLIT SPOON
 ST - PRESSED SHELBY TUBE
 HA - HAND SAMPLER
 CC - CONTINUOUS CORE

BORING METHOD

HSA - HOLLOW STEM AUGER
 CFA - CONTINUOUS FLIGHT AUGER
 HA - HAND AUGER
 MD - MUD DRILLING

SUBSURFACE EXPLORATION LOG

BORING NUMBER: B-13

CLIENT: Log Sort Yard
 JOB NUMBER: 5494-001-300
 LOCATION: ANACORTES, WA
 SURFACE ELEVATION: 14.0

GEOLOGIST: Siegfried Traeger
 DATE DRILLED: 3/17/93
 DRILLING COMPANY: HAYES DRILLING, INC.
 REVIEWED BY:

TOTAL DEPTH: 21.5 Feet
 DRILLING METHOD: Hollow Stem Auger
 SAMPLE METHOD:
 APPROVED BY:

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
							Black SOIL, moist, soft.	WD ML		
5		B-16-3		SS	2-1-1		Black, waxy substance, light brown SAND, no smell, medium grain.	WD ML		3.5
		B-16-6		SS	1-3-3		Same as above.	WD ML		5
		B-16-8		SS	1-1-1		Same as above.	WD ML		6
10								WD		7
				SS	4-3-2		No recovery, catcher blocked by wood piece; *	WD		8
15								WD		9
				SS	2-8-13		Cuttings still same as above only saturated, flows easily, still burnt smell.	CL		10
20				SS	4-11-16		Gray, CLAY, firm, low plasticity, burnt smell still present.			11
				SS	7-10-15		No recovery with 2" attempt to drive a 1.5" Split Spoon. No recovery, cohesion of clay, pull sample out of spoon.			12
							Same as above.			13
25							NOTES: 1) Bottom of hole at 24.5 feet. *) Burnt smell same as boring B-12			14

SAMPLER TYPE

SS - SPLIT SPOON
 ST - PRESSED SHELBY TUBE
 HA - HAND SAMPLER
 CC - CONTINUOUS CORE

BORING METHOD

HSA - HOLLOW STEM AUGER
 CFA - CONTINUOUS FLIGHT AUGER
 HA - HAND AUGER
 MD - MUD DRILLING

SUBSURFACE EXPLORATION LOG

CLIENT: Log Yard
 JOB NUMBER: 5494-001-300
 LOCATION: ANACORTES, WA
 SURFACE ELEVATION:

GEOLOGIST: Siegfried Traeger
 DATE DRILLED: 3/15/93
 DRILLING COMPANY: HAYES DRILLING, INC.
 REVIEWED BY: N=555,802.9

BORING NUMBER: B-14

TOTAL DEPTH: 25.5 Feet
 DRILLING METHOD: Hollow Stem Auger
 SAMPLE METHOD: 10.73
 APPROVED BY: E=1,210,539.5

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
			0.0	SS		2-3-5	CLAY Sample taken, firm gray CLAY, low plasticity.	OL		
30							NOTES: 1) Bottom of hole at 25.5 feet.			30
35										35
40										40
45										45
50										50

SAMPLER TYPE

SS - SPLIT SPOON HA - HAND SAMPLER
 ST - PRESSED SHELBY TUBE CC - CONTINUOUS CORE

BORING METHOD

HSA - HOLLOW STEM AUGER HA - HAND AUGER
 CFA - CONTINUOUS FLIGHT AUGER MD - MUD DRILLING

SUBSURFACE EXPLORATION LOG

CLIENT: Log Yard
 JOB NUMBER: 5494-001-300
 LOCATION: ANACORTES, WA
 SURFACE ELEVATION:

GEOLOGIST: Siegfried Traeger
 DATE DRILLED: 3/15/93
 DRILLING COMPANY: HAYES DRILLING, INC.
 REVIEWED BY: N=555,802.9

BORING NUMBER: B-14

TOTAL DEPTH: 25.5 Feet
 DRILLING METHOD: Hollow Stem Auger
 SAMPLE METHOD: 16.73
 APPROVED BY: E=1,210,539.5

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
							WOOD debris and sand.	WD		
5				SS	3-4-5		Light brown, loose SAND, medium grain, some gravel, black tar like substance mixed with sample, moist.	GP		5
				SS	7-20-13		No recovery, cuttings moist, SAND medium grain, light brown-green, gravels, black tar-like substance still present.			
10		B-14-10	0.0	SS	3-5-7		Poor recovery, green, hard fibrous material with SAND, medium grain, wet.	CL		10
			0.0	SS	2-1-2		Decomposed wood, wet sample taken.	CL WD		
				SS	8-4-3		Poor recovery, blocked by wood plug.	WD		
15			0.0	SS	3-5-7		No recovery, cuttings black SAND and SILT, wet, some pebbles.	GM		15
20		B-14-25		SS	3-6-3		No recovery, cuttings same.	GM		20
								OL		
25										25

SAMPLER TYPE

SS - SPLIT SPOON
 ST - PRESSED SHELBY TUBE
 HA - HAND SAMPLER
 CC - CONTINUOUS CORE

BORING METHOD

HSA - HOLLOW STEM AUGER
 CFA - CONTINUOUS FLIGHT AUGER
 HA - HAND AUGER
 MD - MUD DRILLING